REMARKS

1. Claims 1 – 19 are in the case. Claims 2 and 15 have been amended. No new matter has been added by the amendments to the Specification. I do not believe that any additional filing fees are due; however, should there be any additional fees due, please charge Deposit Account No. 11-0245.

2. Applicant included a PTO 1449 with the initial filing of the application. Applicant notes that this PTO 1449 was not included in the Office Action. Applicant requests that the Examiner include this PTO 1449 with the next Office Action and include the cited art as part of the examination of this application.

3. The Examiner objected to Claim 15 because of an informality. Applicant corrected the informality by amending Claims 2 and 15. A new listing of the claims is enclosed.

4. 35 U.S.C. §102(e) Rejection. The Examiner rejected Claims 1-5, 7-8, and 12-19 as being anticipated by the Williams Patent (U.S. Patent No. 6,445,155B1). Applicant respectfully traverses the rejection as set forth in the discussion below.

The Examiner stated that Williams disclosed the element of "choosing at least one PWM duty cycle of interest" because of item 45 in Figure 1 of Williams. In reviewing Figure 1 of Williams, Applicant does not find an item labeled 45. In its written specification Williams discusses a first processing means 45. However this first processing means 45 calculates a duty voltage based on the voltage measured for the particular phase. In contrast,

in the current invention the duty cycle values of interest are specifically selected to produce a reliable range of values from which the current (and therefore the resistance) of the motor can be determined.

The Examiner also argues that the element of the current invention that "each of the periods being in opposite polarity from the preceding period and the current is measured during each of the periods" is disclosed in Williams by Figure 2 (items 42-45) and Figures 4 and 5. Again, Applicant finds no Item 45 in Figure 2. Additionally, Figures 4 and 5 show opposing polarity applied with overlap. Elements (c) and (d) of Claim 1 of the current invention include the limitation that the each of said periods is of "***opposite polarity from the period preceding it***." In contrast Figures 4 and 5 of Williams show the selected PWM values chosen so that one value is applied wholly within the opposite value, not in opposite polarity from the period preceding it.

The Examiner also states that Claims 2 and 14 are rejected under 102(e) because Williams, Figure 2, Item 45 shows "two or more PWM or voltage values are chosen and sent to Item 45 for processing." However, as stated above, the PWM of Williams is set in response to the voltage for the phase at issue. The method in Williams is in contrast to the current invention, which chooses PWM duty cycles so that a reliable calibration can be performed.

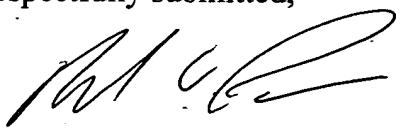
The Examiner argues that Claims 3, 8, 12, 18 and 19 are not allowable under 102(e) because Williams discloses these elements at Figure 2 (items 40-46) and at "***Column 45-56***." There are no columns 45 - 56 in the Williams patent, so the Applicant is uncertain of the exact text to which the Examiner is referring. Nevertheless, the Applicant's invention moves the motor so that one avoids the situation of having a brush span two commutator segments, which would lead to a measurement of zero current. (Application, page 4, lines 13-20). This problem concerning the brush and commutator alignment, and the instant invention's solution to the problem, are not discussed by Williams.

The Examiner rejected Claims 4-6, 15, and 17; arguing that Williams in Figure 4 showed the element of the instant invention relating to the structure of the duty cycles. It is respectfully submitted that this is a misinterpretation of the disclosure of Williams. Figure 4 in Williams specifically teaches that a PWM signal of one polarity is applied wholly within a PWM signal applied with opposite polarity so as to achieve zero current. (Williams, column 3, lines 40-52.) In contrast, as discussed above, the claimed invention alternates the periods of opposing polarity so as to avoid brush and commutator positions which result in zero current.

5. Based on the above amendments and remarks I believe that all of the claims remaining in the case are allowable and an early Notice of Allowability is respectfully

requested. If the Examiner believes a telephone conference will expedite the disposition of this matter he is respectfully invited to contact this attorney at the number shown below.

Respectfully submitted,



Russel O. Primeaux
Reg. No. 37,213
KEAN, MILLER, HAWTHORNE, D'ARMOND, MCCOWAN & JARMAN, L.L.P.
P.O. Box 3513
Baton Rouge, Louisiana 70821-3513
Telephone: (225) 387-0999
Fax: (225) 388-9133
Email: russel.primeaux@keanmiller.com
www.keanmiller.com

Dated: June 24, 2003

CLAIMS (VERSION WITH MARKINGS TO SHOW CHANGES MADE)

1. (Original) A method of calibrating a DC motor, comprising the steps of:

a) choosing at least one PWM duty cycle value of interest;

b) applying a startup PWM duty cycle of sufficient magnitude to insure motion of said motor;

c) performing a first test wherein the first chosen duty cycle is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods;

a'

d) performing a test for each additional chosen PWM duty cycle value of interest, wherein each of said PWM duty cycles is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods; and

e) calculating the apparent resistance of the motor.

2. (Amended) The method of calibrating a DC motor of claim 1, wherein at least two PWM duty cycle values of interest are chosen.

3. (Original) The method of calibrating a DC motor of claim 1 further comprising the steps of:

a) applying a PWM sufficient to move said motor prior to each operational movement of said motor;

b) taking a supplemental measurement of the current in said motor; and

c) modifying said calculated apparent resistance.

a1

4. (Original) The method of calibrating a DC motor of claim 1, wherein the test for each chosen PWM duty cycle values of interest comprises at least four periods.

5. (Original) The method of calibrating a DC motor of claim 1 wherein said periods are of equal time.

6. (Original) The method of calibrating a DC motor of claim 5 wherein said periods are approximately equal to two milliseconds.

7. (Original) The method of calibrating a DC motor of claim 1 further comprising the step of repeating each of said tests.

8. (Original) The method of calibrating a DC motor of claim 7 further comprising the step of applying a startup PWM duty cycle of sufficient magnitude to insure motion of said motor prior to repeating said tests.

9. (Original) The method of calibrating a DC motor of claim 1 wherein said tests are generally conducted in order from low duty cycles to high duty cycles.

A1

10. (Original) The method of calibrating a DC motor of claim 1 wherein each of said periods is characterized by a chopping period, said chopping period being between 10 and 100 microseconds in length.

11. (Original) The method of calibrating a DC motor of claim 1 further comprising the steps of:

a) repeating each of said tests in the same order, recording an independent array of results; and

b) discarding for each value of PWM all but the array exhibiting the lowest average current value, prior to calculating the apparent resistance of the motor.

12. (Original) The method of calibrating a DC motor of claim 1 further comprising the step of applying a voltage to move said motor to a known stop-point.

13. (Original) A method of calibrating a DC motor, comprising the steps of:

a) choosing at least one direct current voltage of interest;

b) applying a startup direct current voltage of sufficient magnitude to insure motion of said motor;

a1

c) performing a first test wherein the first chosen voltage is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods;

d) performing an additional test for each chosen voltage of interest, wherein each of said voltages is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods; and

e) calculating the apparent resistance of the motor.

14. (Original) The method of calibrating a DC motor of claim 13 wherein at least two voltages of interest are chosen.

15. (Amended) The method of calibrating a DC motor of claim 2, wherein one of said chosen PWM duty cycle values is below 50 percent and one of said chosen PWM duty cycle values is above 50 percent.

16. (Original) A method of calibrating a DC motor, comprising the steps of:

a) applying a voltage sufficient to move said motor, while not inducing a large velocity;

b) measuring the current in said motor; and

c) calculating the apparent resistance of said motor.

17. (Original) The method of calibrating a DC motor of claim 16 wherein said voltage is applied with both positive and negative polarity in succession.

18. (Original) The method of calibrating a DC motor of claim 17 wherein said voltage is applied in PWM fashion.

19. (Original) The method of calibrating a DC motor of claim 17 wherein said voltage is applied in DC fashion.